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Secondary teachers' conception of various forms of complex numbers.

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Summary: This study explores in-service high school mathematics teachers' conception of various forms of complex numbers and ways in which they transition between different representations of these forms. One 90-min interview was conducted with three high school mathematics teachers after they completed three professional development sessions, each 4 h, on complex numbers. Results indicate that, in general, these teachers did not necessarily have a dual conception of complex numbers. However, they demonstrated varying conceptions with different forms of complex numbers. Teachers worked at an operational level with the exponential form of complex numbers, but there was no evidence to indicate that they had a structural conception of this form. On the other hand, two teachers were very comfortable with the Cartesian form and exhibited a process/object duality by translating between different representations of this form. These results indicate that high school teachers need more opportunities to help them develop a dual conception of each form (multiple duals), which in turn can result in developing a dual conception of complex numbers. An interesting phenomenon that we found was that teachers who taught courses such as geometry and international baccalaureate were able to draw from their teaching experiences as they attempted the interview tasks. This particular observation may suggest that teachers' teaching assignments coupled with appropriate professional development activities could facilitate their understanding of these concepts.

Classification: F59 C39

Keywords: complex numbers; mathematical content knowledge; operational conception; process/object duality; representations; structural conception

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